WHAT IS CLAIMED IS:

1. A method of forming a nickel layer on a substrate, the method comprising:

introducing a substrate having a surface to a deposition chamber, wherein the deposition chamber has at least one heating element for heating the deposition chamber;

heating the deposition chamber with the heating element; and

depositing a layer of nickel directly on the surface of the substrate with the simultaneous heating of the deposition chamber.

2. The method according to claim 1, comprising heating the deposition chamber with the heating element during the introduction of the substrate to the deposition chamber.

3. The method according to claim 2, comprising heating the deposition chamber with the heating element after depositing the nickel layer on the substrate surface and continue heating the deposition chamber while introducing a second substrate having a surface to the deposition chamber.

4. The method according to claim 1, wherein the heating element comprises a lamp.

5. The method according to claim 4, comprising powering the lamp from about 2 Amp to about 7 Amps during the introduction of the substrate to the deposition chamber and during deposition of the nickel layer.

6. The method according to claim 1, wherein the deposition chamber has a plurality of heating elements for heating the deposition chamber.

7. The method according to claim 1, wherein the substrate comprises silicon and the deposited nickel layer is heated to form a nickel silicide layer.

8. A method of forming nickel layers on substrates, the method comprising:

introducing a first substrate to a deposition chamber, wherein the deposition chamber has at least one heating element for heating the deposition chamber and wherein the deposition chamber is heated prior to introducing the first substrate;

depositing a layer of nickel on the first substrate;

removing the first substrate from the deposition chamber;

introducing a second substrate to the deposition chamber;

depositing a layer of nickel on the second substrate; and

heating the chamber with the heating element continuously between the removal of the first substrate and the introduction of the second substrate.

9. A method of forming a nickel silicide on a semiconductor device, the method comprising:

forming a silicon gate electrode, having an upper surface and side surfaces, overlying a semiconductor substrate with a gate dielectric layer therebetween and source/drain regions in the semiconductor substrate, and a silicon nitride sidewall spacer disposed on the side surfaces;

introducing the semiconductor substrate to a deposition chamber, wherein the deposition chamber has at least one heating element for heating the deposition chamber;

heating the deposition chamber with the heating element;

depositing a layer of nickel directly on the exposed silicon surfaces of the semiconductor substrate with the simultaneous heating of the deposition chamber;

heating the semiconductor substrate to react the deposited nickel with underlying silicon surfaces to form a nickel silicide layer on the gate electrode and a nickel silicide layer on the source/drain regions; and

removing unreacted nickel from the semiconductor substrate.

10. The method according to claim 9, comprising cleaning the semiconductor substrate prior to depositing the nickel layer.

11. The method according to claim 9, comprising heating to form the nickel silicide layer on the gate electrode and source/drain regions at a temperature of approximately 300 °C to approximately 550 °C.

12. The method according to claim 9, comprising heating the semiconductor substrate to form the nickel silicide layer on the gate electrode and source/drain regions for approximately 5 seconds to approximately 2 minute.

13. The method according to claim 9, comprising removing unreacted nickel by wet chemical etching.

14. The method according to claim 9, comprising removing unreacted nickel by immersing the semiconductor substrate in a solution of NH_4OH, H_2O_2 and water or immersing the semiconductor substrate in a solution of H_2SO_4, H_2O_2 and water.

15. The method according to claim 9, comprising forming a conductive connection to the nickel silicide layers without using a cap layer.